

# Claims

- [c1] 1. A multi-chip module (MCM) package heat spreader, comprising:
- a substrate having an opening;
  - a plurality of first bumps;
  - a first chip that has an active surface bonded to and electrically connected with the substrate through the first bumps, the active surface of the first chip facing the opening of the substrate;
  - a plurality of second bumps;
  - at least one second chip disposed in the opening of the substrate and bonded to the active surface of the first chip through the second bumps, the second chip being electrically connected to the first chip through the second bumps; and
  - at least one heat spreader disposed in the opening of the substrate and bonded to the active surface of the first chip.
- [c2] 2. The MCM package of claim 1, further comprising a filling material in the opening of the substrate, between the first chip and the second chip and between the first chip and the substrate, the filling material encapsulating

the first bumps and the second bumps.

- [c3] 3. The MCM package of claim 1, wherein the heat spreader comprises a chip without signal transmission functions.
- [c4] 4. The MCM package of claim 1, wherein the heat spreader is plated with gold.
- [c5] 5. The MCM package of claim 1, further comprising a plurality of third bumps for bonding the heat spreader to the active surface of the first chip.
- [c6] 6. The MCM package of claim 1, further comprising a thermally conductive adhesive for bonding the heat spreader to the active surface of the first chip.
- [c7] 7. The MCM package of claim 1, wherein the chip further comprises a ground contact and the second bumps comprises a ground bump.
- [c8] 8. The MCM package of claim 7, wherein the heat spreader is electrically connected to the ground contact through the ground bump.
- [c9] 9. A multi-chip module (MCM) package with, comprising: a substrate having a cavity and a plurality of thermo-vias passing through the substrate, wherein each of the thermo-vias has one end exposed in the cavity;

a plurality of first bumps;  
a first chip that has an active surface bonded to and electrically connected with the substrate through the first bumps, the active surface of the first chip facing to the cavity of the substrate;  
a plurality of second bumps;  
at least one second chip disposed in the cavity of the substrate and thermally connected with the thermo-vias of the substrate, and electrically bonded to the active surface of the first chip through the second bumps; and  
at least one heat spreader disposed in the cavity of the substrate and thermally connected with the thermo-vias of the substrate and the active surface of the first chip.

[c10] 10. The MCM package of claim 9, further comprising a filling material in the cavity of the substrate, between the first chip and the second chip, and between the first chip and the substrate, the filling material encapsulating the first bumps and the second bumps.

[c11] 11. The MCM package of claim 9, wherein the heat spreader comprises silicon.

[c12] 12. The MCM package of claim 9, wherein the heat spreader is plated with gold.

[c13] 13. The MCM package of claim 9, further comprising a

plurality of third bumps for bonding the heat spreader to the active surface of the first chip.

[c14] 14. The MCM package of claim 9, further comprising a thermally conductive adhesive for bonding the heat spreader to the active surface of the first chip.

[c15] 15. The MCM package of claim 9, wherein the second chip further comprises a ground contact and the second bumps comprises a ground bump.

[c16] 16. The MCM package of claim 15, wherein the heat spreader is electrically connected to the ground contact through the ground bump.

[c17] 17. The MCM package of claim 15, wherein the substrate further comprises a ground-vias and the heat spreader is electrically connected to the ground-vias.

[c18] 18. A multi-chip structure having a chip loaded with at least one other chip and at least one heat spreader, comprising:  
a first chip having an active surface;  
at least one second chip disposed on the active surface of the first chip; and  
at least one heat spreader disposed on the active surface of the first chip.

- [c19] 19. The multi-chip structure of claim 18, further comprising a plurality of bumps for bonding the second chip to the active surface of the first chip.
- [c20] 20. The multi-chip structure of claim 19, further comprising a filling material between the first chip and the second chip encapsulating the bumps.
- [c21] 21. The multi-chip structure of claim 18, further comprising a plurality of bumps for bonding the heat spreader to the active surface of the first chip.
- [c22] 22. The multi-chip structure of claim 21, further comprising a filling material between the first chip and the heat spreader encapsulating the bumps.
- [c23] 23. The multi-chip structure of claim 18, further comprising a thermally conductive adhesive for bonding the heat spreader to the active surface of the first chip.
- [c24] 24. The multi-chip structure of claim 18, wherein the heat spreader comprises silicon.
- [c25] 25. The multi-chip structure of claim 18, wherein the heat spreader is plated with gold.